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INT CL[5] H04B

(54) **Paging receiver capable of displaying repeat call and urgent call**

(57) A paging receiver with a display function is capable of inverting the color of display information representative of a received message and the color of the background on a display or causing the display information to flicker on the display, to distinguish a repeat call or an urgent call from an ordinary call.

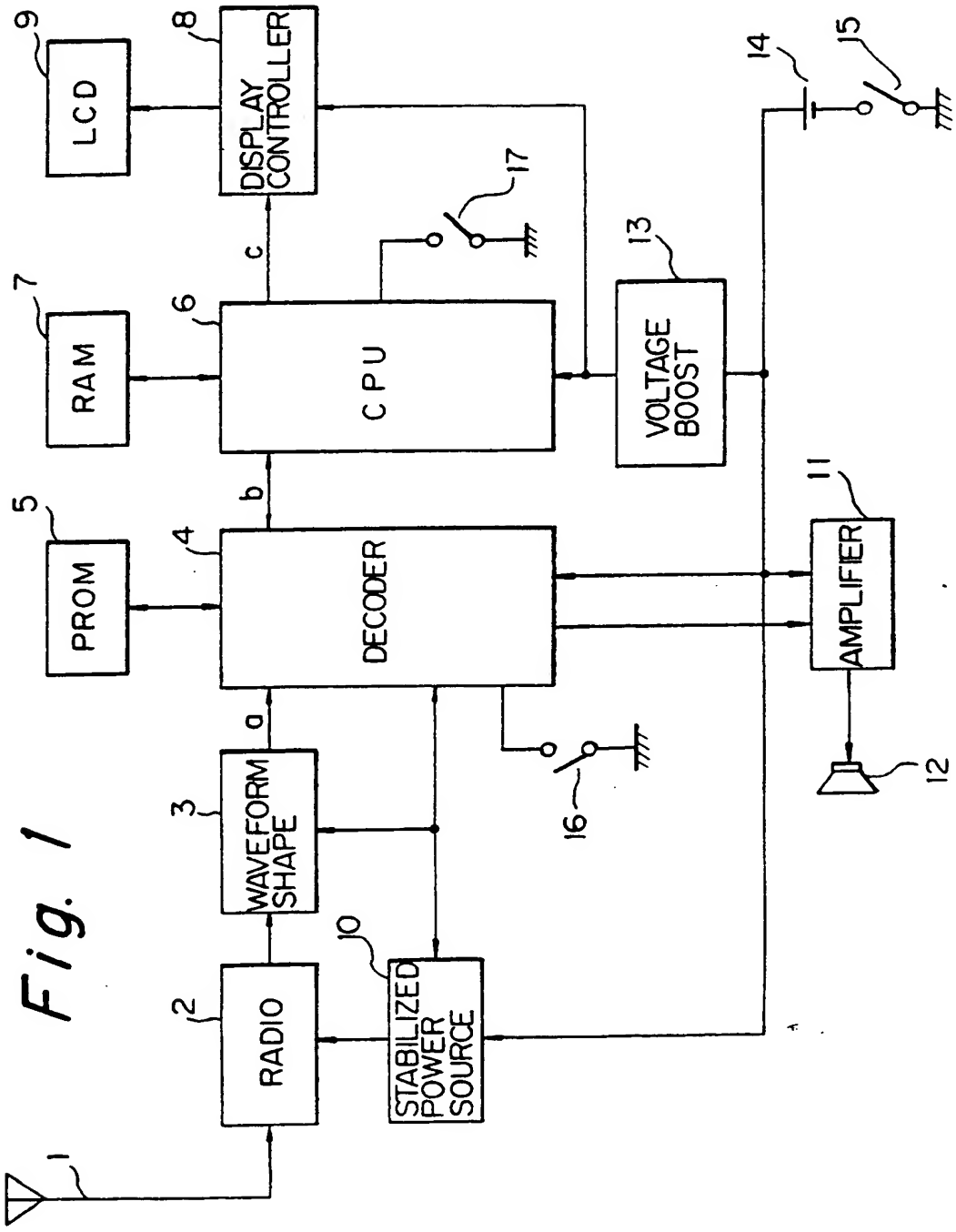

LCD
9
DISPLAY CONTROLLER
8
RAM
7
CPU
6
VOLTAGE BOOST
13
PROM
5
DECODER
4
AMPLIFIER
11
WAVEFORM SHAPE
3
RADIO
2
STABILIZED POWER SOURCE
10
1
12
14
15
16
17
a
b
c

Fig. 1

Fig. 2

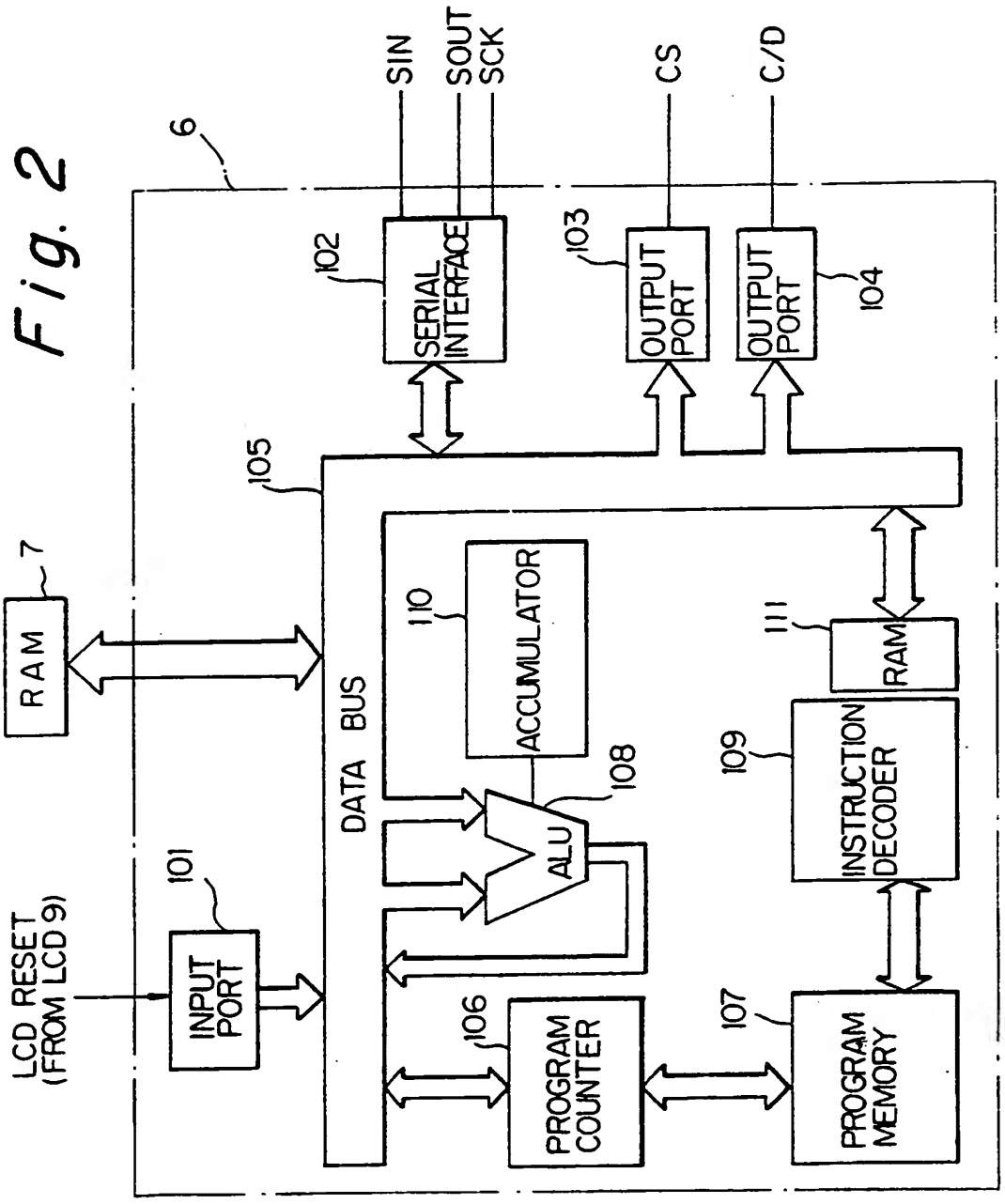

6
SIN
SOUT
SCK
CS
C/D
102
SERIAL INTERFACE
103
OUTPUT PORT
104
OUTPUT PORT
105
7
RAM
DATA BUS
110
ACCUMULATOR
111
RAM
108
ALU
109
INSTRUCTION DECODER
LCD RESET (FROM LCD 9)
101
INPUT PORT
106
PROGRAM COUNTER
107
PROGRAM MEMORY

Fig. 3

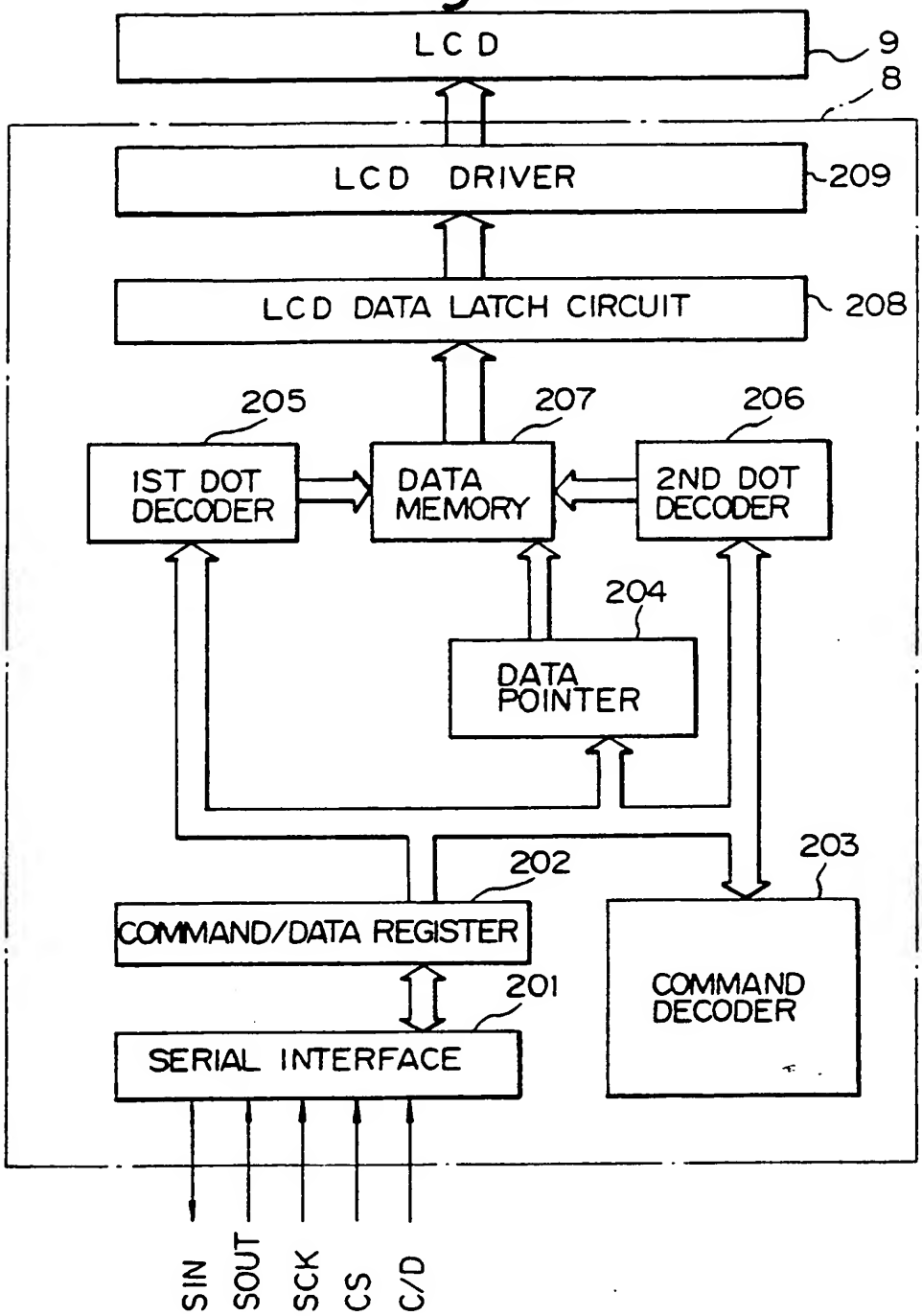

LCD
9
8
LCD DRIVER
209
LCD DATA LATCH CIRCUIT
208
205
207
206
1ST DOT DECODER
DATA MEMORY
2ND DOT DECODER
204
DATA POINTER
203
202
COMMAND/DATA REGISTER
201
COMMAND DECODER
SERIAL INTERFACE
SIN
SOUT
SCK
CS
C/D

Fig. 4

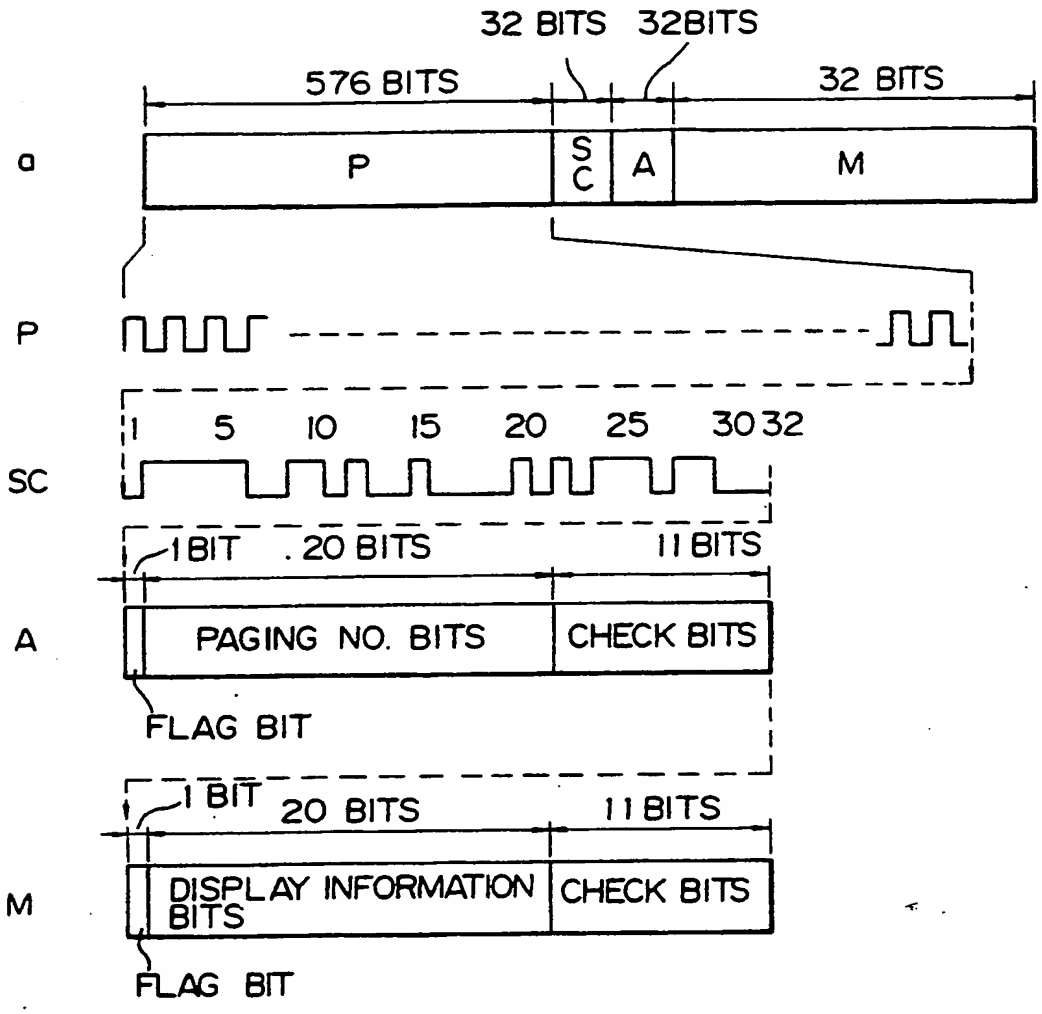

32 BITS
32BITS
576 BITS
32 BITS
a
P
S C
A
M
P
1 5 10 15 20 25 30 32
SC
1 BIT
20 BITS
11 BITS
A
PAGING NO. BITS
CHECK BITS
FLAG BIT
1 BIT
20 BITS
11 BITS
M
DISPLAY INFORMATION BITS
CHECK BITS
FLAG BIT

Fig. 5

Fig. 5A
Fig. 5B

Fig. 5A

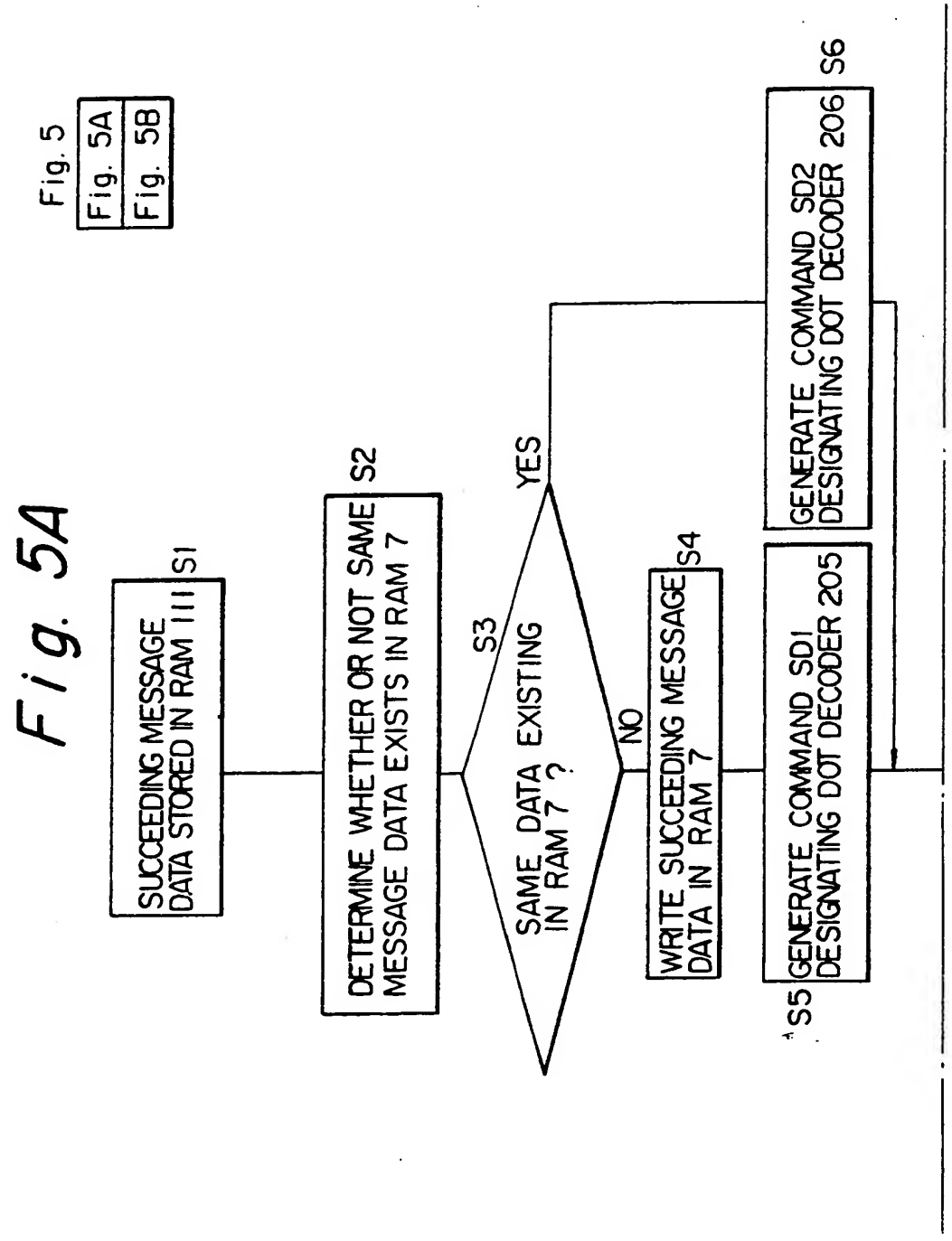


Fig. 5B

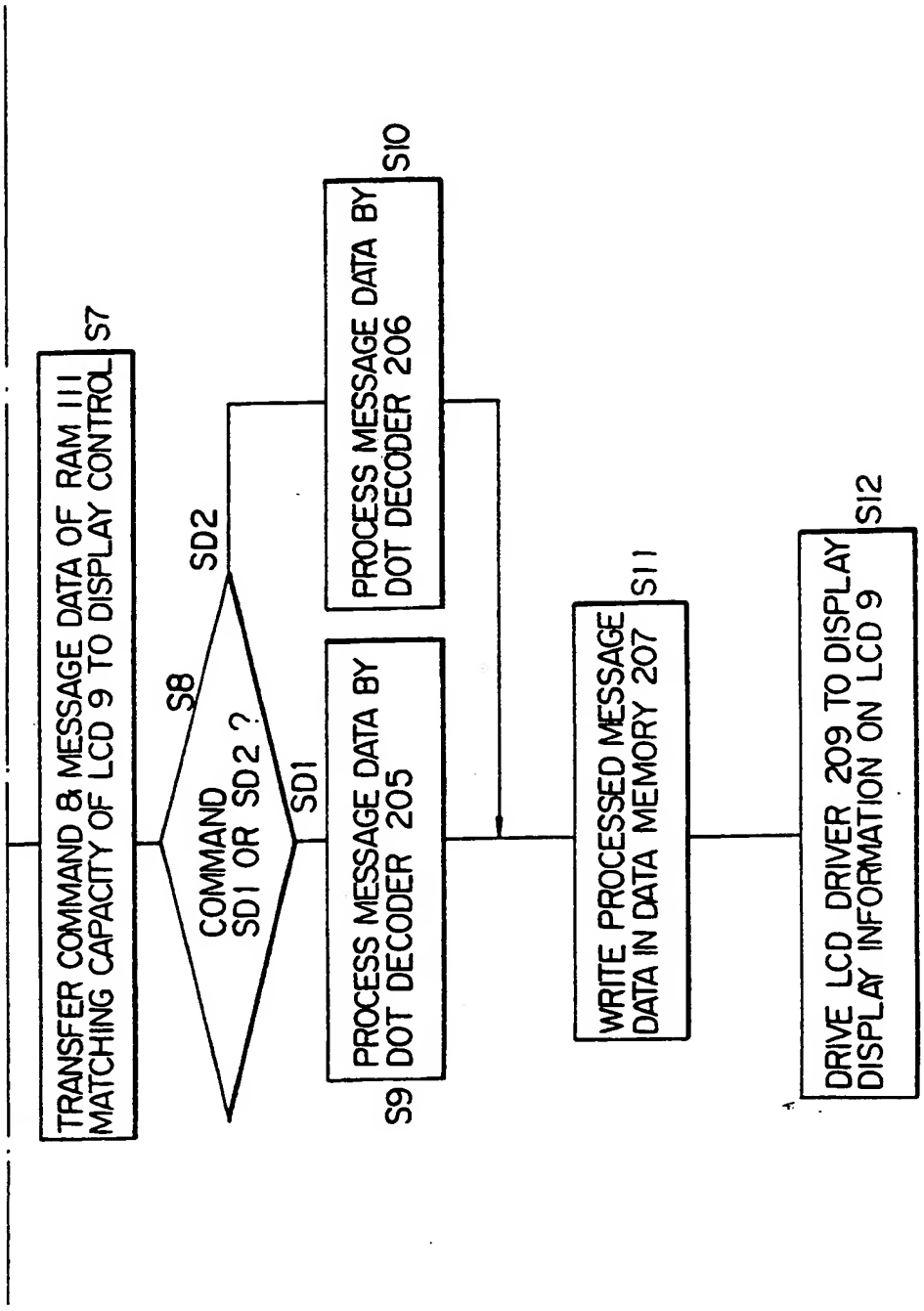

TRANSFER COMMAND & MESSAGE DATA OF RAM 111 MATCHING CAPACITY OF LCD 9 TO DISPLAY CONTROL
S7
COMMAND SD1 OR SD2 ?
S8
SD1
SD2
PROCESS MESSAGE DATA BY DOT DECODER 205
S9
PROCESS MESSAGE DATA BY DOT DECODER 206
S10
WRITE PROCESSED MESSAGE DATA IN DATA MEMORY 207
S11
DRIVE LCD DRIVER 209 TO DISPLAY DISPLAY INFORMATION ON LCD 9
S12

Fig. 6A

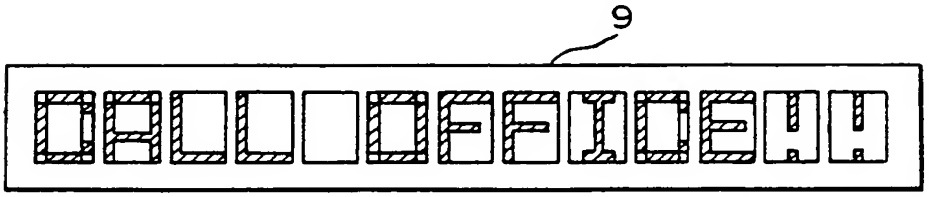


Fig. 6B

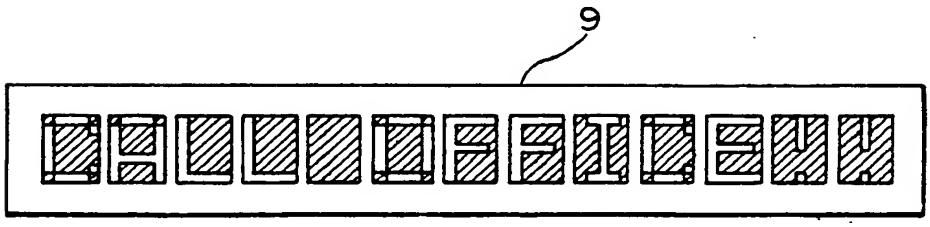


Fig. 7

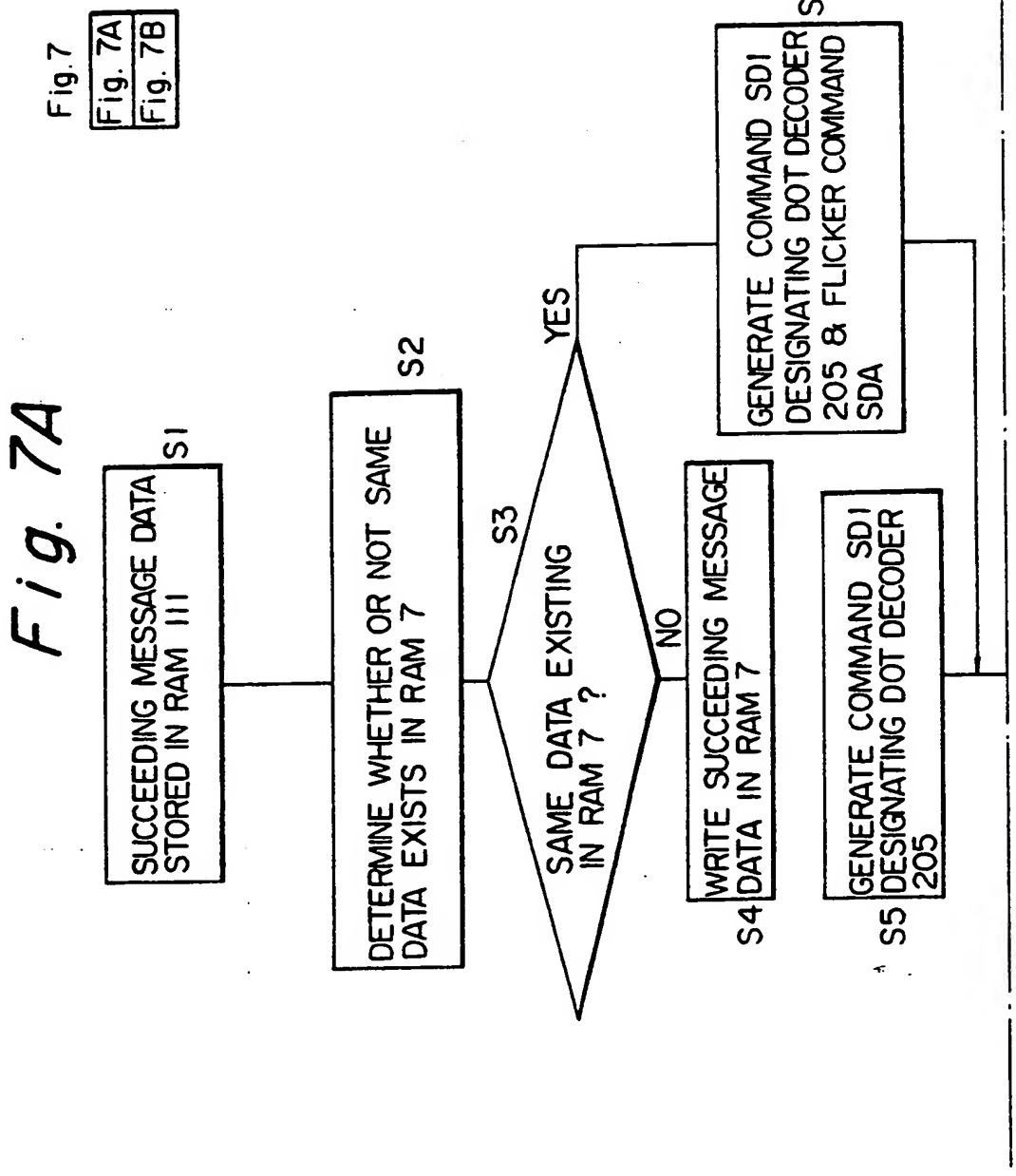


Fig. 7A
Fig. 7B

Fig. 7B

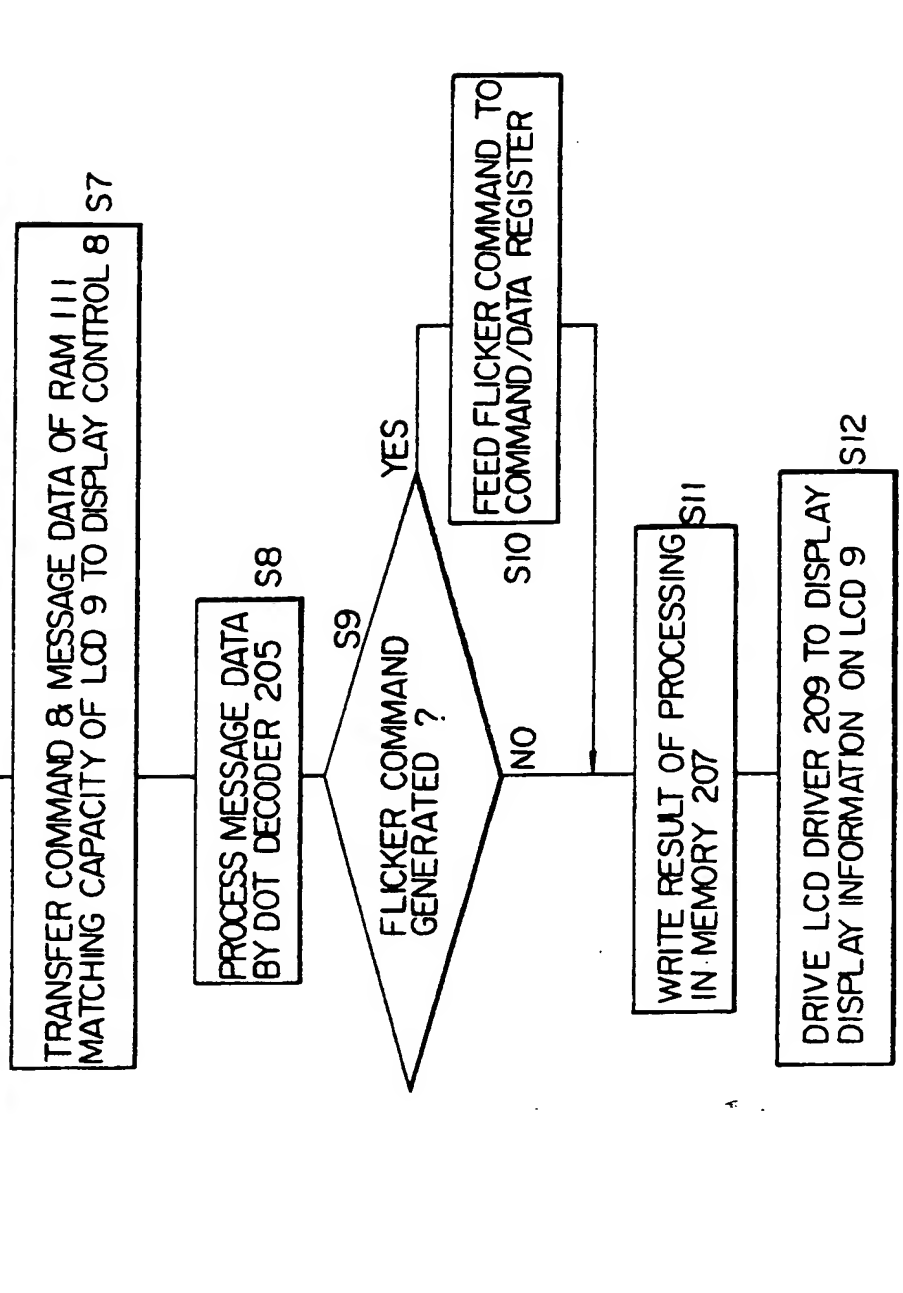

TRANSFER COMMAND & MESSAGE DATA OF RAM 111 MATCHING CAPACITY OF LCD 9 TO DISPLAY CONTROL 8
S7
PROCESS MESSAGE DATA BY DOT DECODER 205
S8
FLICKER COMMAND GENERATED ?
S9
YES
NO
FEED FLICKER COMMAND TO COMMAND/DATA REGISTER
S10
WRITE RESULT OF PROCESSING IN MEMORY 207
S11
DRIVE LCD DRIVER 209 TO DISPLAY DISPLAY INFORMATION ON LCD 9
S12

Fig. 8A
Fig. 8B

Fig. 8A

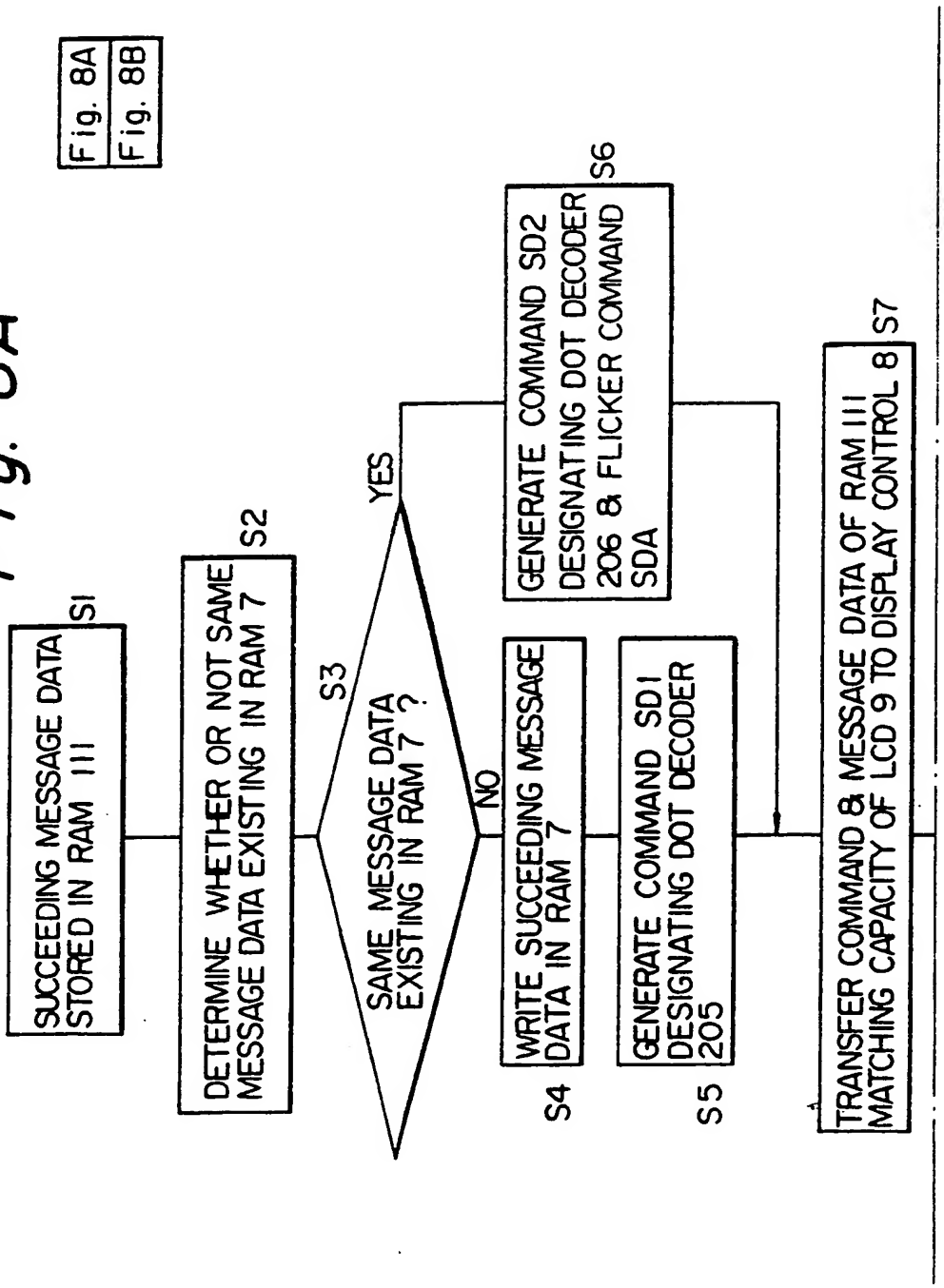


Fig. 8B

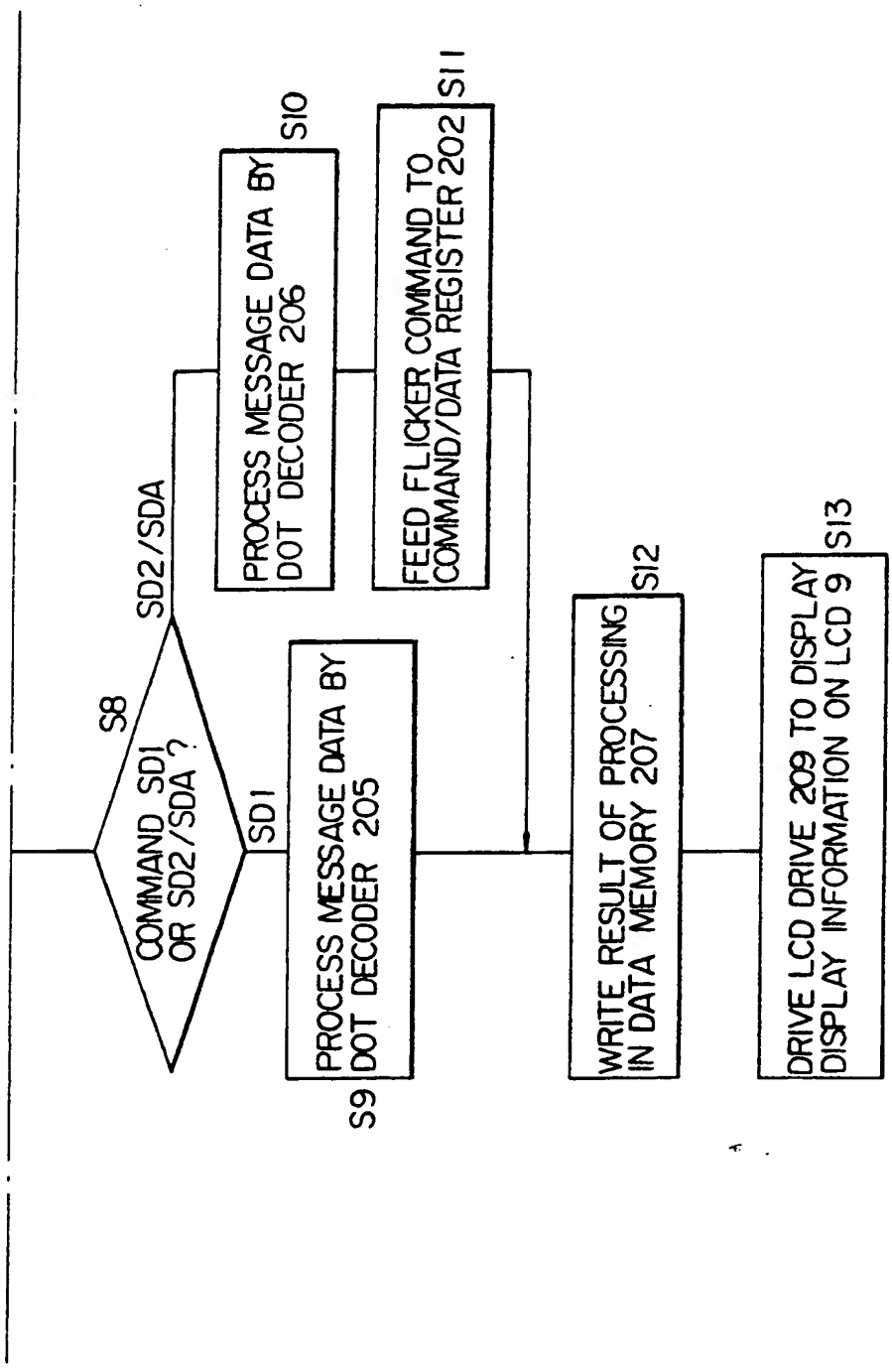

S8
COMMAND SD1 OR SD2/SDA ?
SD1
SD2/SDA
PROCESS MESSAGE DATA BY DOT DECODER 205
S9
PROCESS MESSAGE DATA BY DOT DECODER 206
S10
FEED FLICKER COMMAND TO COMMAND/DATA REGISTER 202
S11
WRITE RESULT OF PROCESSING IN DATA MEMORY 207
S12
DRIVE LCD DRIVE 209 TO DISPLAY DISPLAY INFORMATION ON LCD 9
S13

Fig. 9

Fig. 9A
Fig. 9B

Fig 9A

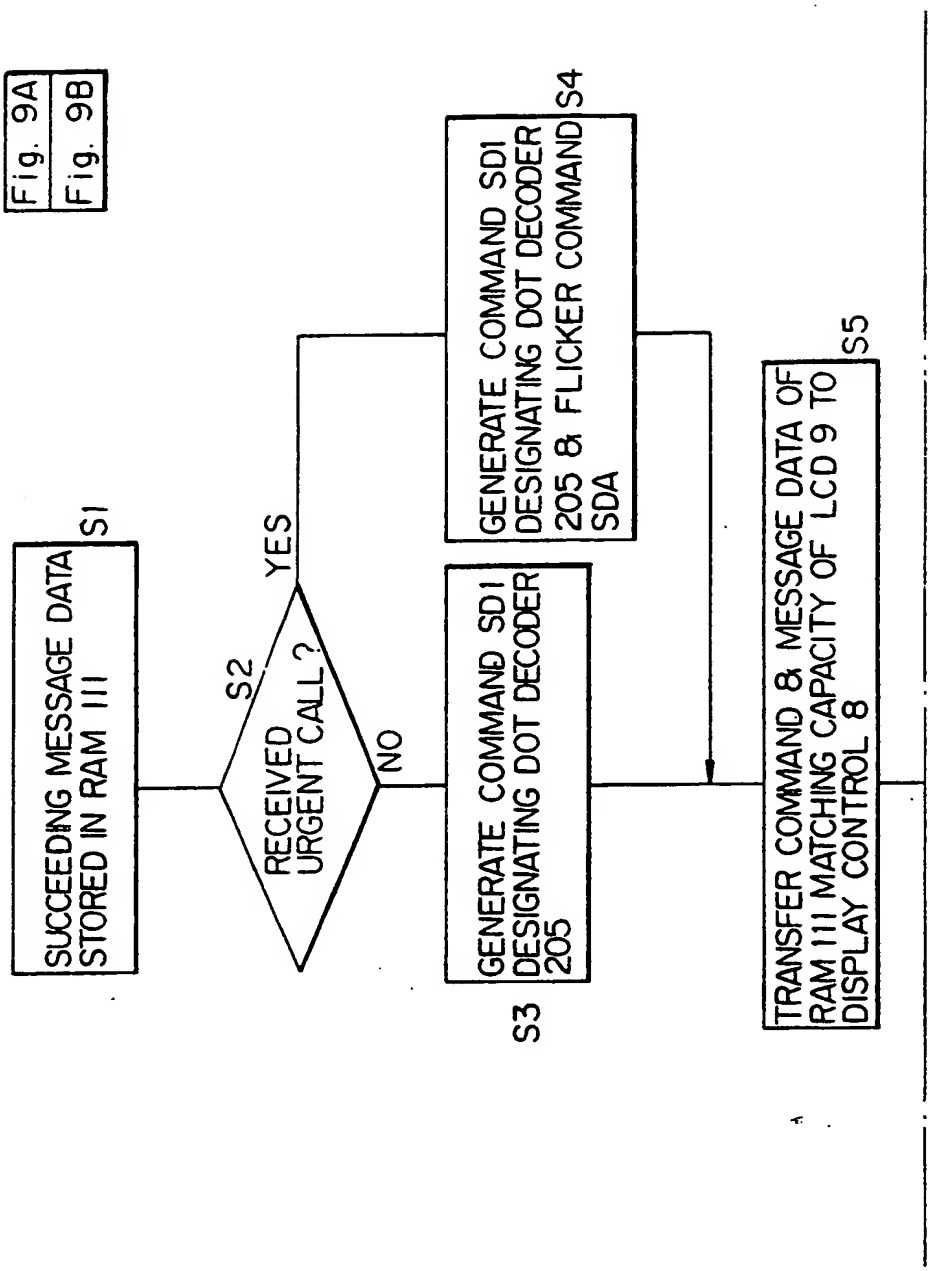


Fig. 9B

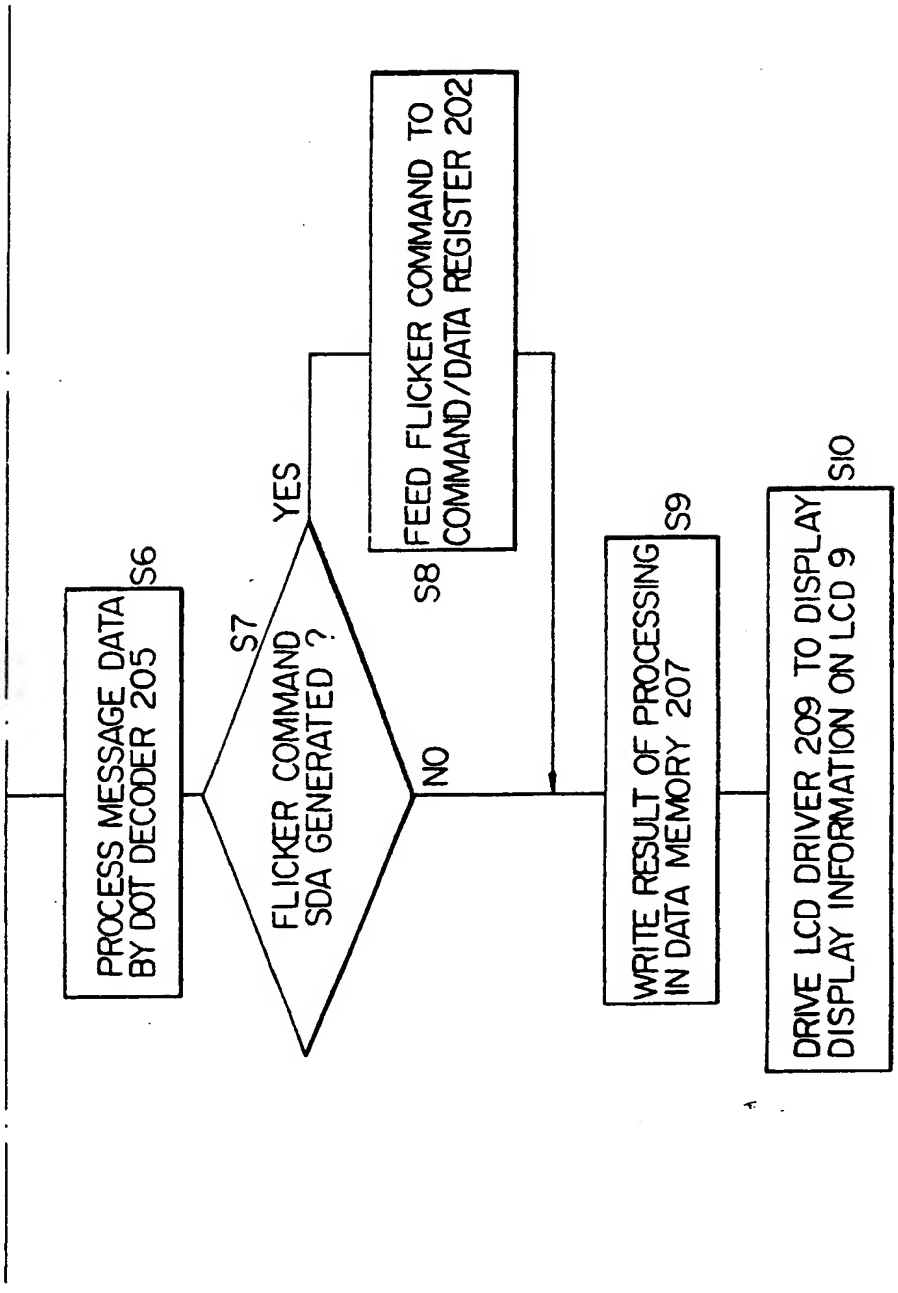

PROCESS MESSAGE DATA BY DOT DECODER 205
S6
FLICKER COMMAND SDA GENERATED ?
S7
YES
NO
FEED FLICKER COMMAND TO COMMAND/DATA REGISTER 202
S8
WRITE RESULT OF PROCESSING IN DATA MEMORY 207
S9
DRIVE LCD DRIVER 209 TO DISPLAY DISPLAY INFORMATION ON LCD 9
S10

Fig. 10

Fig. 10A
Fig. 10B

Fig. 10A

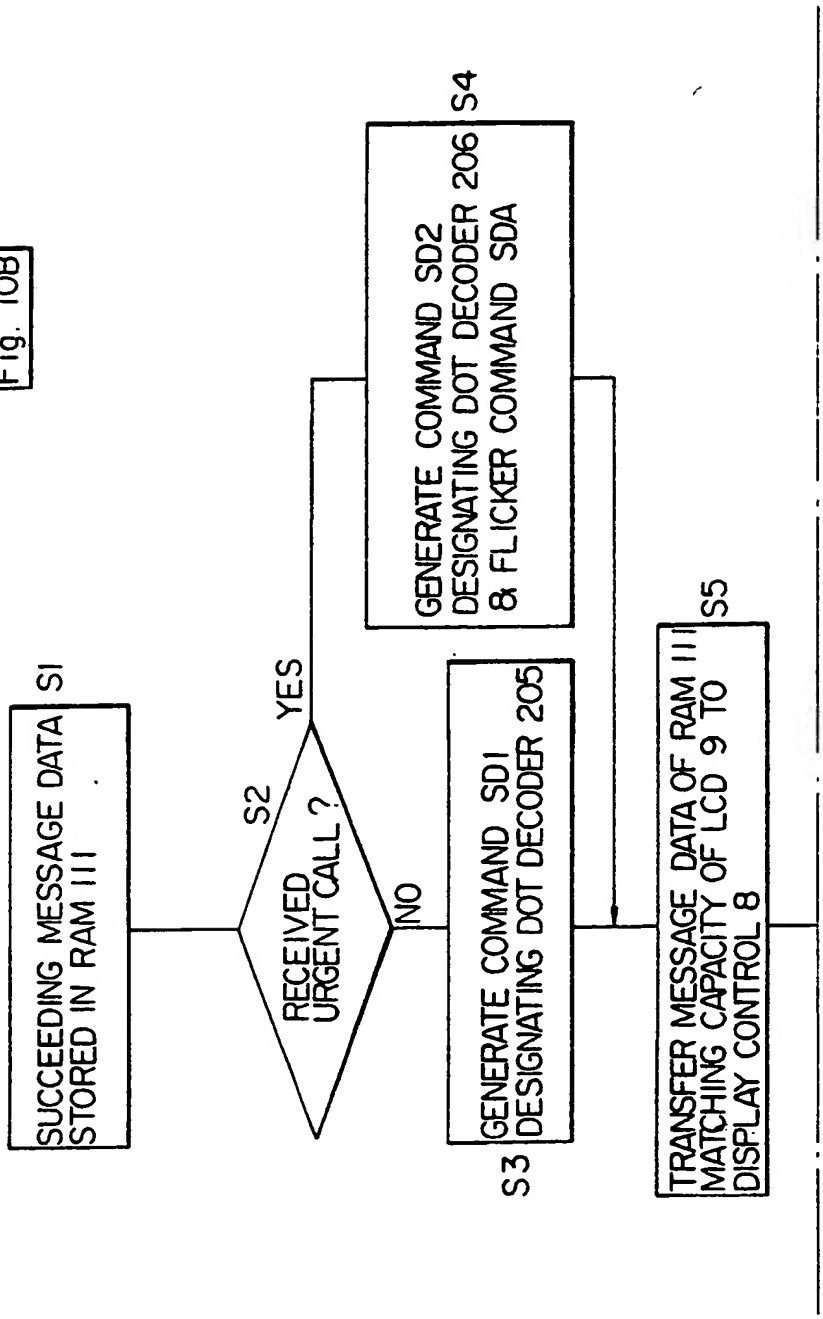
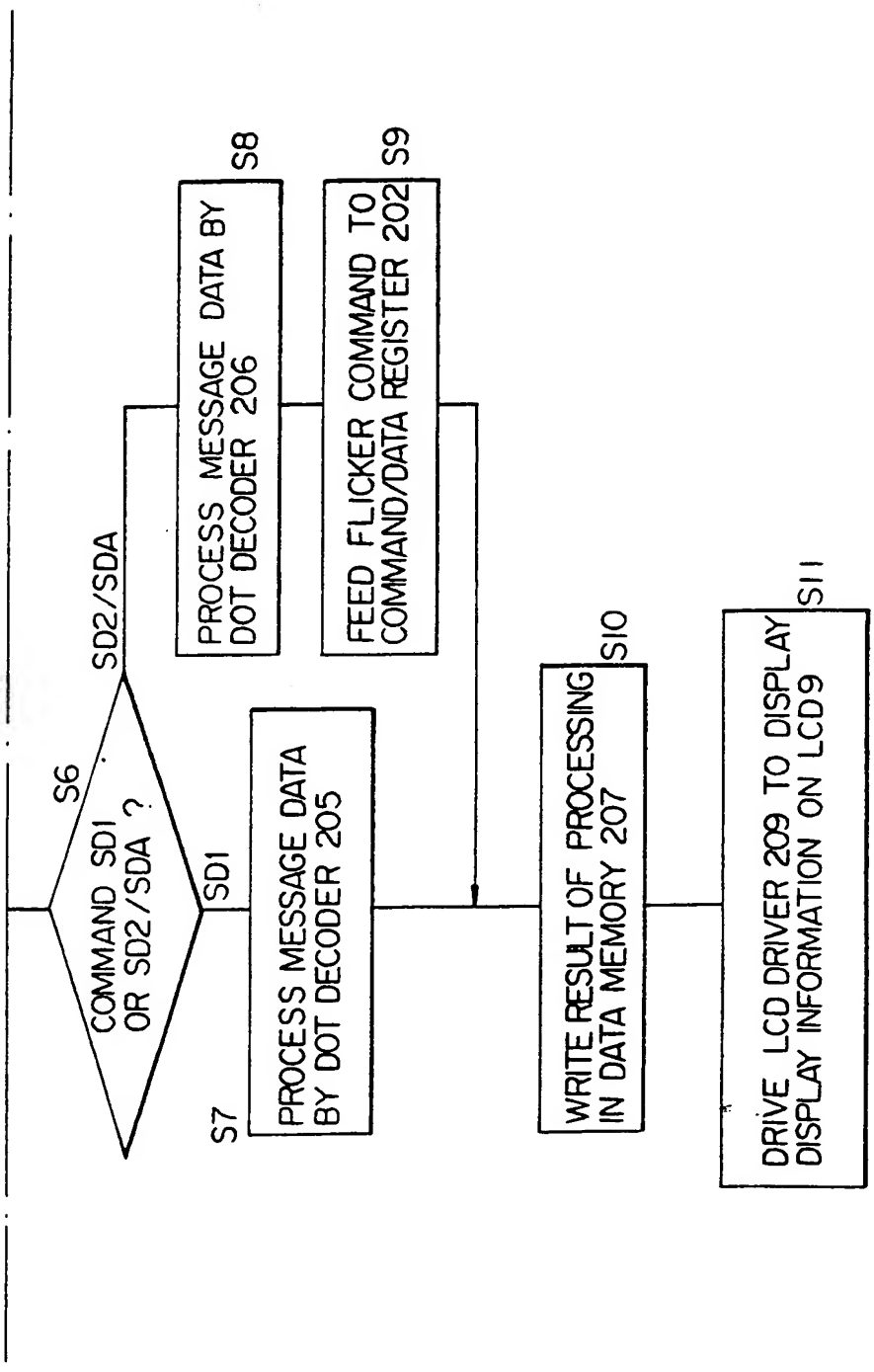


Fig. 10B


S6
COMMAND SD1 OR SD2/SDA ?
SD1
SD2/SDA
S7
PROCESS MESSAGE DATA BY DOT DECODER 205
S8
PROCESS MESSAGE DATA BY DOT DECODER 206
S9
FEED FLICKER COMMAND TO COMMAND/DATA REGISTER 202
S10
WRITE RESULT OF PROCESSING IN DATA MEMORY 207
S11
DRIVE LCD DRIVER 209 TO DISPLAY DISPLAY INFORMATION ON LCD9

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PAGING RECEIVER CAPABLE OF DISPLAYING REPEAT CALL AND URGENT CALL

BACKGROUND OF THE INVENTION

The present invention relates to a paging receiver for use in a radio paging system and, more particularly, to a paging receiver with a display function capable of inverting the color of display information of a received message and that of the background on a display and causing the information to flicker on the display, thereby allowing the user to readily distinguish a repeat call and an urgent call from an ordinary call.

It is a common practice with the above-described type of paging receiver to display, when certain display information is received and then received again afterwards, a message such as "REPEAT" or "RP" on a display in addition to the preceding display information. This shows the user of the receiver that the succeeding display information is a so-called repeat call. However, a conventional paging receiver simply shows the message "REPEAT" or "RP" on the display even when the paging receiver repetitively receives the same display information a plurality of times. Since such a message on the display is too small to readily alert the user to a repeat call, the fact that the display information being displayed on the display is a repeat

call is often overlooked. Many of repeat calls, among others, have important contents and should be promptly recognized by the user to avoid irreparable losses.

Also, when the received display information is an urgent call and displayed in the above-stated conventional fashion, the user is apt to overlook it.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a radio paging receiver with a display function which allows the user to recognize a repeat call or an urgent call at a glance.

It is another object of the present invention to provide a generally improved radio paging receiver with a display function.

In an embodiment to be described, a paging receiver having a display function has a receiving section for generating a digital baseband signal by receiving and demodulating a digital radio signal including display information which has been converted at least into a paging number signal and a message signal. A decoder reads the paging number signal and message signal of the generated digital signal to produce a corresponding paging number and message data. A first memory stores a paging number assigned to the paging receiver beforehand. A first comparing section compares the two paging numbers. A reporting section reports, when the two paging numbers are

identical, terminating call by determining that a call has been terminated. A second memory stores the message data. A display restores the message data to the display information and displays it while accentuating it thereon. A second comparing section compares message data of a preceding call already stored in the second memory and message data of a newly received succeeding call having been produced by processing the succeeding call. A display information accentuating section for determining, when the two message data are identical, that a repeat call has occurred and feeds a command signal for accentuating the display information of the succeeding call to the display.

In a particular embodiment, a paging receiver having a display function has a receiving section for generating a digital baseband signal by receiving and demodulating a digital radio signal including display information which has been converted at least into a paging number signal and a message signal. A decoder reads the paging number signal and message signal of the generated digital signal to produce a corresponding paging number and message data. A first memory stores a paging number assigned to the paging receiver beforehand. A first comparing section compares the two paging numbers. A reporting section reports, when the two paging numbers are identical, a terminating call by determining that a call has been terminated. A second memory stores the

message data. A display restores the message data to the display information and displays the restored display information while accentuating it. A decision section determines whether or not the message data is an urgent call. An accentuating section feeds, when the message data is an urgent call as determined by the decision section, a command signal for accentuating the display information of the message data to the display.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description taken with the accompanying drawings in which:

Fig. 1 is a block diagram schematically showing a paging receiver with a display function embodying the present invention;

Fig. 2 is a block diagram schematically showing a CPU included in the embodiment;

Fig. 3 is a block diagram schematically showing a display controller also included in the embodiment;

Fig. 4 shows a specific format of a received digital radio signal;

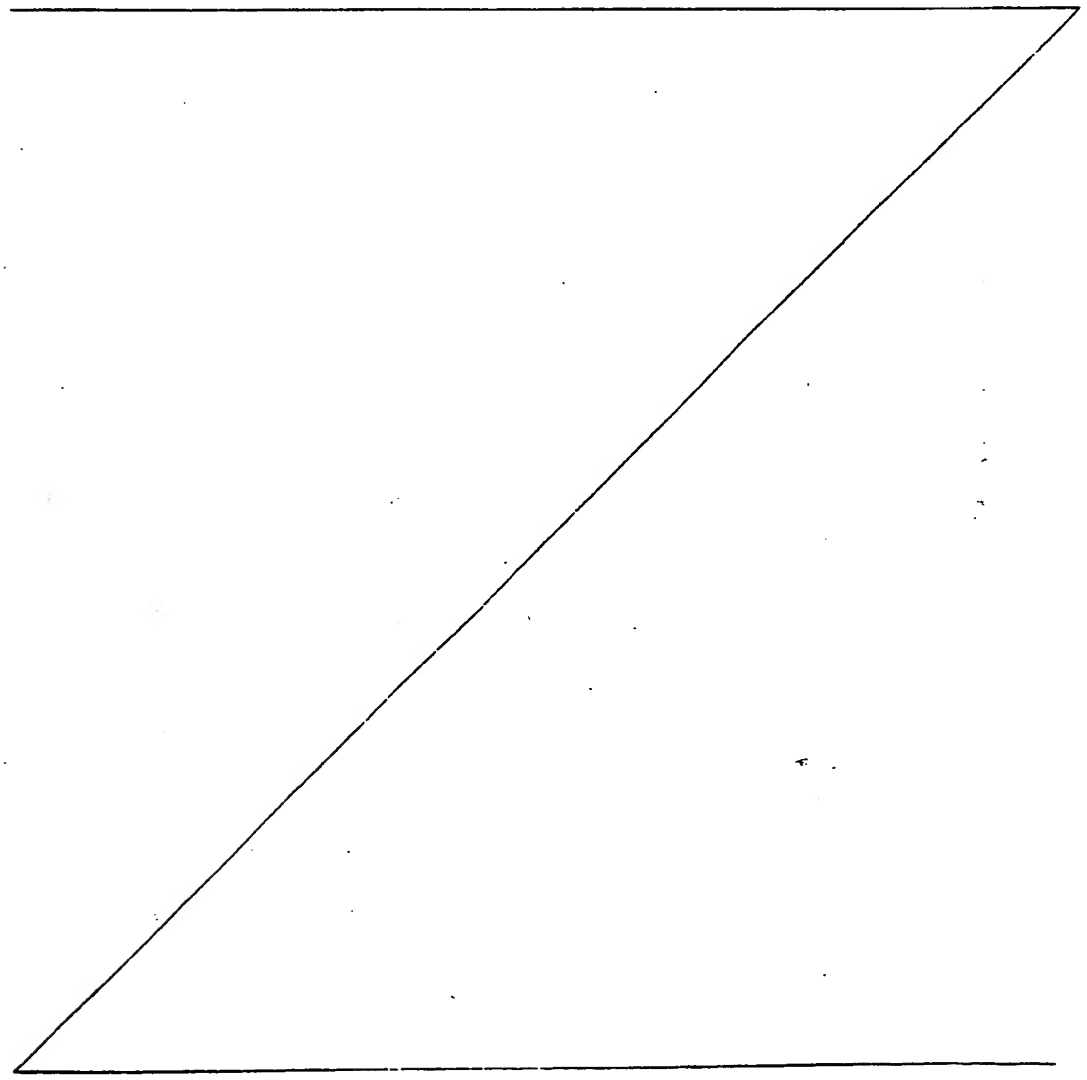
Fig. 5 is a flowchart representative of a specific display function available with the embodiment and pertaining to a repeat call;

Figs. 6A and 6B show specific conditions of a display

implemented by the procedure shown in Fig. 5;

Figs. 7 and 8 are flowcharts showing respectively a second and a third procedure pertaining to a repeat call; and

Figs. 9 and 10 are flowcharts demonstrating respectively a first and a third procedure pertaining to an urgent call and also available with the embodiment.



DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1 of the drawings, a paging receiver with a display function embodying the present invention is shown. As shown, the paging receiver has an antenna 1, a radio section 2, a waveform shaping circuit 3, a decoder 4, a PROM (Progammable Read Only Memory) 5 for storing a paging number assigned to the receiver, a RAM (Random Access Memory) 7 for storing message data, a display control 8, an LCD (liquid crystal display) 9, a stabilized power source 10, an amplifier 11 for amplifying an alert tone, a loudspeaker 12, a voltage boosting circuit 13, a battery 14, and a power switch 15. An alert tone stop switch 16 is accessible for stopping the alert tone by hand. An LCD switch may be operated by hand to sequentially display information in fractions when the information exceeds the display capacity of the LCD 9.

Generally, digital radio signals each has a particular format matching a radio paging system. Figs. 4 shows a specific format of a radio signal *a* coming in through the antenna 1 of the illustrative embodiment. As shown, the received signal *a* has a 576-bit preamble signal P, a 32-bit synchronizing signal SC, a 32-bit address signal A, and a 32-bit message signal M, i. e., 672 bits in total. The preamble signal P is a repetitive pattern of (logical) ONEs and ZEROs and adapted for bit synchronization. The synchronizing signal SC implements frame synchronization. The address signal A includes information

representative of a paging number and is made up of one flag (F) bit which is a ZERO, twenty paging number bits, and eleven check bits using parity code. Likewise, the message signal M includes display information and is made up of one F bit which is a ONE, twenty display information bits, and eleven check bits.

In operation, a digital radio signal coming in through the antenna 1 is demodulated by the radio section 2 and then shaped by the waveform shaping section 3. As a result, a baseband signal *a* having the format shown in Fig. 4 is produced. The decoder 4 sets up bit synchronization by using the preamble signal P and then awaits the frame synchronizing signal SC which follows the signal P. On detecting the frame synchronizing signal SC, the decoder 4 reads the paging number assigned to the receiver out of the PROM 5 and, at the same time, reads a paging number of the paging number bits (paging number signal) out of the address signal A of the signal *a*. Then, the decoder 4 determines whether or not the two paging numbers are identical. If they are identical, the decoder 4 activates the CPU 6 by a signal *b*, Fig. 1, so as to cause it to receive and decode the message signal M which follows the address signal A. As a result, the message signal M is transformed to message data. It is to be noted that the display information bits of the message signal include display information for conveying a caller's message, e. g. characters, symbols and/or patterns. On

determining that the two paging numbers are identical, the decoder 4 causes the loudspeaker 12 to sound via the amplifier 11 by a predetermined procedure and method. The sound, or alert tone, informs the user of the receiver of the termination of a call. Then, the user may operate the alert tone stop switch 16 to stop the alert tone.

The message data including display information is processed by the CPU 6 and then transferred to the display control 8 to be converted into display information data. The display control 8 drives the LCD 9 to display the display information data. In response, the LCD 9 displays the received message as display information. Implemented as a dot matrix type display, the LCD 9 selectively turns on display information in the form of dots or the background in response to the display information data. As a result, the display information and the background each is displayed in a particular color. The colors of the display information and background also differ from a turn-on condition to a turn-off condition, depending on the property of the liquid crystal used. When the display information exceeds the maximum display capacity available with the LCD 9, the user may turn on the LCD switch 17 to see the information which will then sequentially appear in fractions on the LCD 9. When the last fraction of information appears on the LCD 9, the user may again turn on the LCD switch 17 to cause the information to disappear. The message data is transferred to the RAM 7

through the CPU 6. If message data identical with the message data so fed to the RAM 7 already exists in the RAM 7 as a preceding call, the CPU 6 determines that a preceding call exists and does not write the succeeding message data to the RAM 7. The CPU 6 transfers a display inversion signal *c*, Fig. 1, to the display control 8 together with the succeeding message data. Consequently, the color of the display information and the color of the background are inverted on the LCD 9.

The CPU 6 will be described more specifically with reference to Fig. 2. As shown, the CPU 6 has an input port 101, a serial interface 102, output ports 103 and 104, a data bus 105, and a program counter 106. A program memory 107 stores command sequences to be executed and reads a content out of an address designated by a program counter. An arithmetic and logic unit (ALU) 108 performs arithmetic and logical operations, as needed. An instruction decoder 109 decodes information read out of the program memory 107 and feeds control signals matching the command to various components of the CPU 6. An accumulator 110 implements the interchange of data among the input port 101, serial interface 102, and output ports 103 and 104. A RAM 111 is used to store message data, program variables, and other various data.

Fig. 3 shows a specific construction of the display control 8. There are shown in the figure a serial interface 201, a command/data register 202, a command decoder 203, a data

pointer 204, a first dot decoder 205, a second dot decoder 206, a data memory 207, an LCD data latch 208, and an LCD driver 209.

How the CPU 6 transfers data to the display control 8 will be described with reference to Figs. 2 and 3. First, the CPU 6 changes the level of a signal $\overline{CS}$ appearing on the output port 103 to a low level to cause the display control section 8 into a message data input mode. After message data has been applied to the display control 8, the CPU 6 changes the signal $\overline{CS}$ to a high level with the result that the display control 8 is caused into a mode for displaying the message data, i. e. display information. Subsequently, the CPU 6 sequentially transfers a signal SOUT, i. e., a command and message data via the serial interface 102 at particular timings determined by a signal SCK. To allow the display control 8 to see if the signal SOUT is a command or message data, a signal $C/\overline{D}$ appearing on the output port 104 of the CPU 6 goes high when the signal SOUT is a command or goes low when it is message data.

On receiving the serial signal from the CPU 6, the serial interface 201 included in the display control 8 feeds it to the command/data register 202. When a command is fed to the command/data register 202, the register 202 transfers the command to the command decoder 203. The command decoder 203 decodes the command and, based on the content of the command, controls the command/data register 202, data

pointer 204, first dot decoder 205, and second dot decoder 206. At this instant, the data pointer 204 controls the data memory 207 as to from which part of the data memory 207 display information data should be read out. When message data is fed to the command/data register 202, the register 202 transfers the message data to either one of the first and second dot decoders 205 and 206 which is designated by the command decoder 203. In response, the dot decoder 205 or 206 converts the input message data to display information data to be displayed on the LCD 9. Specifically, the dot decoder 205 generates display information data for turning on only the dots of the LCD 9 which should represent display information. On the other hand, the dot decoder 206 generates display information for turning on only the dots other than the above-mentioned dots, i. e., the dots representative of the background. Hence, in response to the command from the command decoder 203, either one of the dot decoders 205 and 206 is selected to invert the color of the display information and that of the background on the LCD 9. The display information data from the dot decoder 205 or 206 is written to the data memory 207 and, at the same time, transferred to the LCD driver 209 via the LCD data latch 208 which is a buffer for holding display information data. The LCD driver 209 drives the LCD 9 on the basis of the display information data having been stored in the data memory 209, whereby a received message appears on the display LCD 9

as display information.

A reference will be made to Figs. 5, 7 and 8 for described three different procedures which are available with the embodiment for prompting the user to see that display information appearing on the LCD 9 is a repeat call.

Referring to Fig. 5, a first procedure which is of the type inverting the color of the display information and that of the background on the LCD 9 will be described. As shown in a step S1, assume that the paging receiver has already received a succeeding message signal M and stored the corresponding message data in the RAM 111 of the CPU 6. The ALU 108 of the CPU 6 determines whether or not message data identical with the succeeding message data exists in the RAM 7 (S2 and S3) and, if the answer is negative, writes the succeeding message data in the RAM 7 (S4). Thereafter, the ALU 108 generates a command SD1 for designating the first dot decoder 205 and sends it out over the signal line SOUT (S5). Conversely, if message data identical with the subsequent message data exists in the RAM 7, the ALU 108 generates a command SD2 for designating the second dot decoder 206 (S6). The commands SD1 and SD2 each is outputted via the serial interface 102. Subsequently, the CPU 6 sends the command and, among the message data stored in the RAM 111, only a fraction which the LCD 9 can display at a time to the display control 8 (S7). The display control 8 distinguishes the command and the message data by referencing

the level of a signal C/D and feeds the former to the command decoder 203 and the latter to either one of the dot decoders 205 and 206 which is designated by the command decoder 203. The command decoder 203 determines whether the input command is SD1 or SD2 (S8). The command decoder 203 commands the command/data register 202 to transfer the message data to the dot decoder 205 if the command SD1 is inputted or to the other dot decoder 206 if the command SD2 is inputted (S10). In response, the dot decoder 205 or 206 transforms the message data to display information data and then writes it in the data memory 207 (S11). The display information data is fed to the LCD driver 209 via the LCD data latch 208 to be displayed on the LCD 9 as display information (S12).

Fig. 6A shows specific display information appearing on the LCD 9 and representative of a newly received message signal M in the above-stated first procedure. Fig. 6B shows specific display information appearing on the LCD 9 in the event of a repeat call, i.e., message data identical with the newly received message data has already been stored in the RAM 7. As shown, in the case of a repeat call, the display information in the form of characters and the background are inverted in color to allow the user to see if it is a repeat call rapidly.

Referring to Fig. 7, a second procedure which is of the type causing display information to flicker in the event of a repeat call will be described. Assume that the paging receiver has already received a succeeding message signal M and stored the corresponding message data in the RAM 111 of the CPU 6 (S1). The ALU 108 of the CPU 6 determines whether or not message data identical with the succeeding message data exists in the RAM 7 (S2 and S3) and, if the answer is negative, writes the succeeding message data in the RAM 7 (S4). Thereafter, the ALU 108 generates a command SD1 for designating the first dot decoder 205 and sends it out over the signal line SOUT (S Conversely, if message data identical with the subsec message data exists in the RAM 7, the ALU 108 generate command SD1 and a command SDA for switching di information on and off intermittently on the LCD 9 (S6). The commands SD1 and SDA each is outputted via the serial interface 102. Subsequently, the CPU 6 sends the command and, among the message data stored in the RAM 111, only a fraction which the LCD 9 can display at a time to the display control 8 (S7). The display control 8 distinguishes the command and the message data by referencing the level of a signal C/D and feeds the former to the command decoder 203 and the latter to the dot decoder 205 which is designated by the command decoder 203. The command decoder 203 commands the command/data register 202 to transfer the message data to the dot decoder 205

if only the command SD1 is inputted or to transfer it to the dot decoder 205 and then cause the LCD driver 209 to switch display information on and off intermittently if both of the commands SD1 and SDA are inputted (S8 to S10). In response, the dot decoder 205 transforms the message data to display information data and then writes it in the data memory 207 (S11). The display information data is fed to the LCD driver 209 via the LCD data latch circuit 208 to be displayed on the LCD 9 as display information (S12). At this instant, if the LCD driver 209 is instructed by the command/data register 202 to switch display information on and off intermittently, the LCD driver 209 causes the display information to flicker on the LCD 9. In this manner, the second procedure dislays display information in the form of characters as usual in the event of a normal call or causes it to flicker in the event of a repeat call.

Fig. 8 shows a third procedure which also causes display information to flicker on the LCD 9 in the event of a repeat call. Assume that the paging receiver has already received a succeeding message signal M and stored the corresponding message data in the RAM 111 of the CPU 6 (S1). The ALU 108 of the CPU 6 determines whether or not message data identical with the succeeding message data exists in the RAM 7 (S2 and S3) and, if the answer is negative, writes the succeeding message data in the RAM 7 (S4). Thereafter, the ALU 108 generates a command SD1 for designating the first dot decoder

205 and sends it out over the signal line SOUT (S5). Conversely, if message data identical with the subsequent message data exists in the RAM 7, the ALU 108 generates a command SD2 for designating the second dot decoder 206 and a command SDA for switching display information on and off intermittently on the LCD 9 (S6). The commands SD2 and SDA each is outputted via the serial interface 102. Subsequently, the CPU 6 sends the command and, among the message data stored in the RAM 111, only a fraction which the LCD 9 can display at a time to the display control 8 (S7). The display control 8 distinguishes the command and the message data by referencing the level of a signal C/D and feeds the former to the command decoder 203 and the latter to the dot decoder 205 or 206 which is designated by the command decoder 203. The command decoder 203 commands the command/data register 202 to transfer the message data to the dot decoder 205 if only the command SD1 is inputted or to transfer it to the dot decoder 206 and then cause the LCD driver 209 to switch display information on and off intermittently if both of the commands SD2 and SDA are inputted (S8 to S11). In response, the dot decoder 205 transforms the message data to display information data and then writes it in the data memory 207 (S12). The display information data is fed to the LCD driver 209 via the LCD data latch circuit 208 to be displayed on the LCD 9 as display information (S13). At this instant, if the LCD driver 209 is

instructed by the command/data register 202 to switch display information on and off intermittently, the LCD driver 209 causes the display information to flicker on the LCD 9. As described above, the third procedure displays display information in the form of characters as usual in the case of a normal call or inverts the colors of display information and background and, further, causes the information to flicker in the case of a repeat call.

A reference will be made to Figs. 9 and 10 for describing two different procedures which the embodiment may practice to allow the user to recognize an urgent call on the LCD 9 at a glance.

Fig. 9 shows a first procedure of the type causing display information to flicker on the LCD 9. Assume that the paging receiver has already received a succeeding message signal M and stored the corresponding message data in the RAM 111 of the CPU 6 (S1). The ALU 108 of the CPU 6 determines whether or not an urgent call has been received (S2). If a call has been received in an address other than an address exclusively assigned to an urgent call, the ALU 108 generates a command SD1 for designating the first dot decoder 205 and sends it out over the signal line SOUT (S3). On the other hand, if a call has been received in the address assigned to an urgent call, the ALU 108 generates the command SD1 and a command SDA for causing display information to flicker on the LCD 9 (S4). The commands

SD1 and SDA each is outputted via the serial interface 102. Subsequently, the CPU 6 sends the command and, among the message data stored in the RAM 111, only a fraction which the LCD 9 can display at a time to the display control 8 (S5). The display control 8 distinguishes the command and the message data by referencing the level of a signal C/D and feeds the former to the command decoder 203 and the latter to the dot decoder 205 which is designated by the command decoder 203. The command decoder 203 commands the command/data register 202 to transfer the message data to the dot decoder 205 if only the command SD1 is inputted or to transfer it to the dot decoder 205 and then cause the LCD driver 209 to switch display information on and off intermittently if both of the commands SD1and SDA are inputted (S6 to S8). In response, the dot decoder 205 transforms the message data to display information data and then writes it in the data memory 207 (S9). The display information data is fed to the LCD driver 209 via the LCD data latch circuit 208 to be displayed on the LCD 9 as display information (S10). At this instant, if the LCD driver 209 is instructed by the command/data register 202 to switch display information on and off intermittently, the LCD driver 209 causes the display information to flicker on the LCD 9. In this manner, the first procedure pertaining to urgent call displays display information in the form of characters as usual in the event of a normal call or causes it to flicker in the event of an urgent call.

Fig. 10 shows a second procedure pertaining to an urgent call. Assume that the paging receiver has already received a succeeding message signal M and stored the corresponding message data in the RAM 111 of the CPU 6 (S1). The ALU 108 of the CPU 6 determines whether or not an urgent call has been received (S2). If a call has been received in an address other than an address exclusively assigned to an urgent call, the ALU 108 generates a command SD1 for designating the first dot decoder 205 and sends it out over the signal line SOUT (S3). On the other hand, if a call has been received in the address assigned to an urgent call, the ALU 108 generates a command SD2 for designating the second dot decoder 206 and a command SDA for causing display information to flicker on the LCD 9 (S4). The commands SD1 and SDA each is outputted via the serial interface 102. Subsequently, the CPU 6 sends the command and, among the message data stored in the RAM 111, only a fraction which the LCD 9 can display at a time to the display control 8 (S5). The display control 8 distinguishes the command and the message data by referencing the level of a signal C/D and feeds the former to the command decoder 203 and the latter to the dot decoder 205 or 206 which is designated by the command decoder 203. The command decoder 203 commands the command/data register 202 to transfer the message data to the dot decoder 205 if only the command SD1 is inputted or to transfer it to the dot decoder 206 and then cause

the LCD driver 209 to switch display information on and off intermittently if both of the commands SD1and SDA are inputted (S6 to S9). In response, the dot decoder 205 transforms the message data to display information data and then writes it in the data memory 207 (S10). The display information data is fed to the LCD driver 209 via the LCD data latch circuit 208 to be displayed on the LCD 9 as display information (S11). At this instant, if the LCD driver 209 is instructed by the command/data register 202 to switch display information on and off intermittently, the LCD driver 209 causes the display information to flicker on the LCD 9. In this manner, the second procedure pertaining to an urgent call displays display information in the form of characters as usual in the event of a normal call or inverts the colors of display information and background and, further, causes the information to flicker in the event of an urgent call.

In summary, it will be seen that the present invention provides a paging receiver which allows the user of the receiver to recognize a repeat call or an urgent call at a glance by inverting the color of display information and that of background or by switching display information on and off intermittently. The present invention, therefore, enhances accurate transmission of information.

Various modifications will become possible for those skilled in the art after receiving the teachings of the present disclosure without departing from the scope thereof.

CLAIMS

1. A paging receiver having a display function, comprising:

receiving means for generating a digital baseband signal by receiving and demodulating a digital radio signal including display information which has been converted at least into a paging number signal and a message signal;

decoding means for reading said paging number signal and said message signal of said generated digital signal to produce a corresponding paging number and message data;

first storing means for storing a paging number assigned to said paging receiver beforehand;

first comparing means for comparing said paging number and said paging number assigned to said paging receiver;

reporting means for reporting, when said two paging numbers are identical, a terminating call by determining that a call has been terminated;

second storing means for storing said message data;

displaying means for restoring said message data to said display information and displaying said restored display information while accentuating said display information thereon;

second comparing means for comparing message data of a preceding call already stored in said second storing means and message data of a newly received succeeding call having been produced by processing said succeeding call; and

display information accentuating means for determining,

when said two message data are identical, that a repeat call has occurred and feeding a command signal for accentuating said display information of said succeeding call to said displaying means.

2. A paging receiver as claimed in claim 1, wherein said displaying means inverts, in response to said command signal, a color of said display information of said succeeding call and a color of background relative to a color of display information and a color of background of said preceding call.

3. A paging receiver as claimed in claim 1, wherein said display means causes, in response to said command signal, said display information of said succeeding call to flicker.

4. A paging receiver having a display function, comprising:

receiving means for generating a digital baseband signal by receiving and demodulating a digital radio signal including display information which has been converted at least into a paging number signal and a message signal;

decoding means for reading said paging number signal and said message signal of said generated digital signal to produce a corresponding paging number and message data;

first storing means for storing a paging number assigned to said paging receiver beforehand;

first comparing means for comparing said paging number and said paging number assigned to said paging receiver;

reporting means for reporting, when said two paging

numbers are identical, a terminating call by determining that a call has been terminated;

second storing means for storing said message data;

displaying means for restoring said message data to said display information and displaying said restored display information while accentuating said display information thereon;

decision means for determining whether or not said message data is an urgent call; and

accentuating means for feeding, when said message data is an urgent call as determined by said decision means, a command signal for accentuating said display information of said message data to said displaying means.

5. A paging receiver as claimed in claim 4, wherein said displaying means causes said display information of said message data to flicker in response to said command signal.

6. A paging receiver as claimed in either claim 1 or claim 4 substantially as described herein with reference to the accompanying drawings.

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